SL No of QP : 10393
Unique paper code : 6333490009
Name of the paper : Formal Languages and Automata Theory (NEP UGCF)
Name of the course : B.Voc (Web Designing)
Semester : VII
Time: 3 Hours Maximum Marks: 90

Instructions for Candidates:

(a) Write your Roll No. on the top immediately on receipt of this question paper.
(b) Question No. 1 is compulsory in Section-A.
(c) Attempt any four questions from Section-B.
(d) Parts of a question should be attempted together.

Section A

Q1. (a) Explain the Chomsky Classification of language. 3

(b) Define ambiguity in grammar? Can it be removed? if yes, how? 3

(c) Differentiate between DFA and NDFA with the help of suitable examples. 3

(d) Prove L={ab n : n>=0} to be regular using pumping lemma. 3

(e) Construct TM that recognizes language over alphabet 0,1 such that string ends in 10. 3

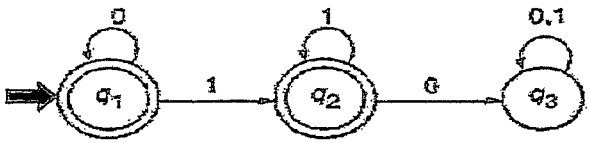
(f) Design a FA from given regular expression 10 + (0 +11) 0 *1 3

(g) Prove that LHS RE is equivalent to RHS RE 3
(1+00*1)+(1+00*1)(0+10*1)*(0+10*1) = 0*1(0+10*1)*

(h) What are the closure properties of CFL? 3

(i) What properties of recursive enumerable seta are not decidable? 3

(j) Construct a regular expression for DFA shown below: 3



Section B

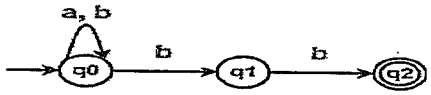
Q2. (a) Convert the given grammar to CNF 8
1. S → a | aA | B 2. A → aBB | ε 3. B → Aa | b

(b) Demonstrate the model of Linear bound automata(LBA) with neat diagram 7

Q3. (a) Define with example 8
i. Left Recursion
ii. Leftmost and Rightmost derivation
iii. Ambiguous grammar
iv. Parse Tree

(b) Design a PDA for accepting a palindrome L(M) = {WCWR | Wϵ(a+b)*} where WR is reverse of W and show ID for the string "aab" 7

Q4. (a) Convert following NFA to DFA 5



(b) Design DFA to Accept stings of 0's and 1's L={ starting with 01 or starting with 10} 5

(c) Construct a DFA to accept strings of 0's and 1's starting with at least two 0's and ending with at least two 1's 5

Q5. (a) State Arden's theorem. 5

(b) Construct the minimum state automata equivalent to finite automata given by (Q0 is the initial state and Q3,Q4 are final states): 5

State	a	b
→Q0 (initial state)	Q1	Q2
Q1	Q4	Q3
Q2	Q4	Q3
Q3 (Final state)	Q5	Q6
Q4 (Final state)	Q7	Q6
Q5	Q3	Q6
Q6	Q6	Q6
Q7	Q4	Q6

(c) Prove that the complement of a regular language is also regular. 5

Q6. (a) Obtain the unambiguous grammar for the grammar shown and get the derivation for the expression (a+b)*(a-b). 5

1. E ->□ E+E | E-E
2. E -> E*E | E/E
3. E -> (E) | I
4. I-> a|b|c

(b) Consider the following grammar 5

1. S→AbB 2. A→ aA | Є 3. B→ aB | bB | Є

Give LMD and RMD and Parse tree for the string "aaabab "

(c) State and prove pumping lemma Theorem 5

Q7. (a) Explain The Church-Turing machine with neat a diagram 5

(b) Explain Multiple TM with a neat diagram 5

(c) Show that regular languages are closed under Union,concatenation and Kleens star 5